

TR RAI 5.7.8-1

Regulatory Guide 4.14 recommends the surface water samples be analyzed for dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210 and Po-210. Consistent with Regulatory Guide 4.14 and NUREG-1569, Acceptance Criterion 5.7.7.3(1), provide an operational surface water sampling and analysis program that addresses these analyses or technical justification for an alternate program.

TR RAI 5.7.8-1 Response

The following describes the operational surface water sampling and analysis program that will be implemented by Powertech. For additional information on the impoundments and stream sampling monitoring sites included in the surface water operational monitoring program, please refer to the responses to TR RAI 2.9-43(a) and TR RAI 2.9-43(b), respectively. The following information will be incorporated into the revised TR.

Operational surface water monitoring will include quarterly monitoring of all surface impoundments located down-gradient (i.e., potentially subject to surface runoff) from proposed activity and surface waters passing through the site or located down-gradient of proposed activity. As illustrated in Table TR RAI 2.9-43a-1 and Table TR RAI 2.9-43b-2, Powertech proposes to monitor 24 impoundments and 10 stream sampling sites as part of the operational monitoring. Samples collected from the sites will be analyzed for dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210 and Po-210, which is consistent with Regulatory Guide 4.14 recommendations. Sampling methodology is described in the response to TR RAI 5.7.8-19.

TR RAI 5.7.8-2

In 10 CFR 40, Appendix A, Criterion 7, NRC requires an operational monitoring program that can be used to evaluate environmental impacts of operation and to detect potential long-term effects, among other things. Regulatory Guide 4.14 provides guidance on surface water sampling, including impoundments and surface waters passing through the mill site. In Section 2.7.3.1 of the TR the applicant identified 48 surface water impoundments.

However, in Section 5.7.8 of the TR, the applicant identified only 11 impoundments in its operational surface water monitoring program as shown on Figure 5.7-10 of the TR. In addition, the applicant has not identified sampling locations for Beaver Creek which passes through the mill site. The applicant should analyze all surface water features in accordance with Regulatory Guide 4.14 criteria, including offsite water features that could be impacted from operations, or provide a justification for an alternate methodology that complies with 10 CFR 40, Appendix A, Criterion 7.

TR RAI 5.7.8-2 Response

The following describes the operational surface water monitoring program proposed by Powertech. For additional information on the impoundments and stream sampling monitoring sites included in the surface water operational monitoring program, please refer to the responses to TR RAI 2.9-43(a) and TR RAI 2.9-43(b), respectively. In addition, the response to TR RAI 5.7.8-1 provides a description of the operational monitoring sampling and analysis program. The following information will be incorporated into the revised TR.

During ISR operations, 24 impoundments and 10 stream sampling sites, depicted on Exhibit 5.7-I, will be monitored as part of the operational monitoring program. As described in the response to TR RAI 2.9-43(a), impoundments within and surrounding the project area were evaluated based on location in

relation to proposed activity (i.e., down-gradient of proposed well field, CPP, etc.). Table TR RAI 2.9-43a-1 lists all of the impoundments identified during the 2007 field survey and includes two additional impoundments associated with the Darrow Mine pits. The table also illustrates the impoundments that are proposed for operational monitoring and provides justification for impoundments not included. All 24 impoundments identified for operational monitoring will be visited on a quarterly basis throughout construction and operation. Grab samples collected from the impoundments will be analyzed for dissolved and suspended natural uranium, Ra-226, Th-230, Pb-210 and Po-210. In the event that a sample cannot be collected from an impoundment during the quarterly visit, the reason will be stated on a field sheet and reported accordingly.

A total of 10 stream sampling sites are proposed for operational monitoring. To meet the recommendations of Regulatory Guide 4.14, Powertech is proposing six sites not previously included in the baseline monitoring program. During baseline monitoring sites on Beaver Creek (BVC01 and BVC04) and Pass Creek (PSC01 and PSC02) were not located on the site boundary and therefore will be omitted from the operational monitoring program. Powertech will establish a new upstream and downstream site on both Beaver Creek and Pass Creek as well as two additional sites on unnamed tributaries in the southeast portion of the project area. Details for each of the proposed stream sampling sites are provided in Table TR RAI 2.9-43b-2. Grab samples will be collected quarterly from the sites on Beaver Creek (BVC11 and BVC14) and the Cheyenne River (CHR01 and CHR05), while passive samplers (single-stage samplers) will be installed at all other stream sampling sites between the months of April and October. All water samples collected from the sites will be analyzed for dissolved and suspended uranium, Ra-226, Th-230, Pb-210, and Po-210.

TR RAI 2.9-43

10 CFR 40, Appendix A, Criterion 7, requires a preoperational monitoring program to provide complete baseline data on a milling site and its environs. RG 4.14 provides guidance on surface water sampling, including impoundments and surface waters passing through the mill site. Regarding the applicant's preoperational surface water monitoring program, please address the following issues.

For these issues, the applicant should analyze all surface water features in accordance with Regulatory Guide 4.14 criteria, including offsite water features that could be impacted from operations, or provide a justification for an alternate methodology that complies with 10 CFR 40, Appendix A, Criterion 7.

TR RAI 2.9-43(a)

In Section 2.7.3.1 of the TR, the applicant identified 48 surface water impoundments. In Section 2.7.3.1 of the TR the applicant stated that it chose surface water sampling locations based on Regulatory Guide 4.14. However, the applicant only sampled a "representative" number of impoundments resulting in including only 11 impoundments in its preoperational surface water monitoring program as shown on Table 2.7-20 of the TR.

TR RAI 2.9-43(a) Response

The following describes the surface water impoundment monitoring that was completed as part of the baseline monitoring program. For additional information on the inconsistency regarding the number of impoundments included in the monitoring program, please refer to the response to TR RAI 2.7-18. The following information will be incorporated into the revised TR.

A summary of impoundment sampling for the baseline surface water monitoring program is provided in Table TR RAI 2.9-43a-1. The table details all of the 40 impoundments that were identified during the 2007 field survey. During the baseline monitoring program, 11 of the 40 impoundments were visited on a quarterly basis. Table TR RAI 2.9-43a-1 illustrates which of these impoundments were sampled during each quarterly sampling event or provides a reason why a sample could not be collected. Water quality and radionuclide results for each impoundment are provided in Appendix 2.7-C, and 2.9-I, respectively. These appendices are included with this RAI response package and will be included with the revised TR.

Powertech has re-evaluated all of the impoundments within and surrounding the project area, including the impoundments identified during the 2007 field survey. The location of each impoundment in relation to proposed activity was used to determine whether the impoundment would be included in the operational monitoring program. Table TR RAI 2.9-43a-1 lists all of the impoundments and identifies which impoundments are located down-gradient (i.e., potentially subject to surface runoff) from proposed activity or within potential well field areas. The table also denotes the 24 impoundments proposed for operational monitoring, including 2 Darrow pits not included in the baseline monitoring program. Justification for the impoundments not proposed for operational monitoring is provided in the table and is typically due to the impoundment not being located downstream of all proposed activities.

Powertech proposes to visit all 24 of the impoundments proposed for operational monitoring four times (including the initial samples) prior to ISR operations to satisfy the Regulatory Guide 4.14 pre-operational monitoring recommendation. Water samples will be collected, when available, and analyzed for constituents listed in Table 2.7-22 of the TR, which is consistent with Table 2.7.3-1 of NUREG-1569 and Table 1 of Regulatory Guide 4.14.

Impoundments proposed to be included in the operational surface water monitoring program are depicted on Exhibit 5.7-1, which is included with this response package and will be included with the revised TR.

Table TR RAI 2.9-43a-1: Impoundment Pre-Operational Sampling Summary and Impoundments Proposed for Operational Monitoring

Site	Type/Name	Baseline Sampling				Down-Gradient of Proposed Activity*	Proposed for Operational Monitoring	Justification for Not Including in Operational Monitoring Program
		3Q07	4Q07	1Q08	2Q08			
Sub01	Stock Pond	1	1	X	X	No		Not down-gradient and outside of project area
Sub02	Triangle Mine Pit	X	X	X	X	No	Yes	
Sub03	Mine Dam	1	X	1	X	Yes	Yes	
Sub04	Stock Pond	1	X	1	X	Yes	Yes	
Sub05	Mine Dam	1	1	1	1	Yes	Yes	
Sub06	Darrow Mine Pit Northwest	X	X	X	X	Yes	Yes	
Sub07	Stock Dam	X	X	X	X	Yes	Yes	
Sub08	Stock Pond	X	X	X	X	Yes	Yes	
Sub09	Stock Pond	1	1	X	X	Yes	Yes	
Sub10	Stock Pond		1	X	X	Yes	Yes	
Sub11	Stock Pond	X	X	X	X	Yes	Yes	
Sub20	Stock Pond					Yes	Yes	
Sub21	Stock Pond					Yes	Yes	
Sub22	Stock Pond					Yes	Yes	
Sub23	Stock Pond					No		Not an impoundment, infrequent, small pool of water due to inadequate storm water control at county road crossing
Sub24	Stock Pond			X		No		Outside of project area, not located in a project area drainage
Sub25	Stock Pond					No		Outside of project area, not down-gradient
Sub26	Stock Pond					No		Outside of project area, not down-gradient
Sub27	Stock Pond					Yes		Outside of project area, downstream of Sub28
Sub28	Stock Pond					Yes		Outside of project area, downstream of Sub08 and Sub09 with no proposed activity between Sub 08 or Sub09 and Sub28

Table TR RAI 2.9-43a-1: Impoundment Pre-Operational Sampling Summary and Impoundments Proposed for Operational Monitoring (Cont.)

Site	Type/Name	Baseline Sampling				Down-Gradient of Proposed Activity*	Proposed for Operational Monitoring	Justification for Not Including in the Operational Monitoring Program
		3Q07	4Q07	1Q08	2Q08			
Sub29	Stock Pond					Yes	Yes	
Sub30	Stock Pond					Yes	Yes	
Sub31	Stock Pond					Yes	Yes	
Sub32	Stock Pond					Yes	Yes	
Sub33	Stock Pond					Yes	Yes	
Sub34	Stock Pond					Yes	Yes	
Sub35	Stock Pond					Yes	Yes	
Sub36	Stock Pond					Yes	Yes	
Sub37	Stock Pond					Yes		Downstream of Sub36
Sub38	Stock Pond					No		Outside of project area, not down-gradient
Sub39	Stock Pond					No		Not down-gradient
Sub40	Darrow Mine Pit Southeast					Yes	Yes	
Sub41	Stock Pond					Yes		Only down-gradient of potential perimeter monitor wells
Sub42	Stock Pond					No		Not down-gradient
Sub43	Stock Pond					No		Not down-gradient
Sub44	Stock Pond					No		
Sub45	Stock Pond					No		Outside of project area, not down-gradient
Sub46	Stock Pond					No		Outside of project area, not down-gradient
Sub47	Stock Pond					No		Outside of project area, not down-gradient
Sub48	Stock Pond					No		Outside of project area, not down-gradient
Sub49	Darrow Mine Pit	Not Included in 2007 Field Survey				Yes	Yes	
Sub50	Darrow Mine Pit	Not Included in 2007 Field Survey				Yes	Yes	

* Potentially subject to surface runoff from Satellite Facility, CPP, ponds, potential land application areas, pipelines, or potential well field areas.

Notes: X – Sample collected

1-2 – No sample collected due to:

1 – Impoundment was dry during quarterly visit

2 – Impoundment was covered in ice during quarterly visit

TR RAI 2.9-43(b)

b. It appears that the applicant also used this "representative" approach with other surface water features as well. For example, grid 14 on Plate 2.5-1 appears to have three separate drainages exiting the Permit Area, yet they were not sampled.

TR RAI 2.9-43(b) Response

The following describes the stream monitoring that was completed as part of the baseline monitoring program and proposes additional stream monitoring sites in response to this RAI. The following information will be incorporated into the revised TR.

As stated in Section 2.7 of the TR, as part of the baseline monitoring program stream sampling sites were established on Beaver Creek, Pass Creek, the Cheyenne River, Bennett Canyon, and unnamed tributaries. The baseline monitoring program included monthly visits to each site. Grab samples were collected from the sites on Beaver Creek and the Cheyenne River, when available, while automated samplers were installed at the sites on Pass Creek, Bennett Canyon and an unnamed tributary south of the project area. Table TR RAI 2.9-43b-1 provides a baseline stream sampling summary. The table includes the eight stream monitoring sites and illustrates which sites were sampled during each monthly sampling event or provides a reason why a sample could not be collected.

Water quality and radionuclide results for each stream sampling site are provided in Appendix 2.7-C and 2.9-I, respectively. These appendices are included with this RAI response package and will be included in the revised TR.

The stream sampling sites were evaluated against guidance in Regulatory Guide 4.14 to establish an operational monitoring program. Table TR RAI 2.9-43b-2 provides a list of the stream sampling sites proposed for operational monitoring. The table proposes a total of 10 stream sampling sites including 6 new sites, as depicted on Exhibit 5.7-1. Four sites (BVC01, BVC04, PSC01, and PSC02) used for baseline monitoring will be replaced with operational monitoring sites that better meet the guidance in Regulatory Guide 4.14 as follows:

- BVC11 will be located where Beaver Creek exits the project area. This monitoring location will replace BVC01, which was approximately 2 stream miles further downstream, below the confluence with Pass Creek.
- BVC14 will be located where Beaver Creek enters the project area. This monitoring location will replace BVC04, which was approximately 12 stream miles upstream from the project area.
- PSC11 will be located where Pass Creek exits the project area. This monitoring location will replace PSC01, which was approximately 2 stream miles upstream from the PSC11 location, within the project area.
- PSC12 will be located where Pass Creek enters the project area. This monitoring location will replace PSC02, which was about 2 stream miles upstream from the project area.

Prior to ISR operations, Powertech proposes to sample each site monthly (including the initial samples) for 12 consecutive months in accordance with Regulatory Guide 4.14 pre-operational monitoring recommendations. Grab samples will be collected from sites BVC11, BVC14, CHR01, and CHR05. Passive samplers will be installed at the remaining sites to collect samples during ephemeral flow events. Water samples will be analyzed for constituents listed in Table 2.7-22 of the TR, which is consistent with Table 2.7.3-1 of NUREG-1569 and Table 1 of Regulatory Guide 4.14.

Table TR RAI 2.9-43b-1: Baseline Stream Sampling Summary

Site	Type/Name	Sample Type	Jul-2007	Aug-2007	Sept-2007	Oct-2007	Nov-2007	Dec-2007	Jan-2008	Feb-2008	Mar-2008	Apr-2008	May-2008	Jun-2008
BVC01	Beaver Creek Downstream	Grab	X	X	X	X	X	X	X	1	X	X	X	X
BVC04	Beaver Creek Upstream	Grab	X	X	X	X	X	X	X	1	X	X	X	X
CHR01	Cheyenne River Upstream	Grab	X	2	X	X	X	1	3	3	X	X	X	X
CHR05	Cheyenne River Downstream	Grab	X	2	X	X	X	X	1	X	X	X	X	X
PSC01	Pass Creek Downstream	Passive Sampler	X	4	4	4	4	4	4	4	4	4	4	X
PSC02	Pass Creek Upstream	Passive Sampler	X	4	4	4	4	4	4	4	4	4	4	X
BEN01	Bennett Canyon	Passive Sampler	3	4	4	4	4	4	4	4	4	4	4	4
UNT01	Unnamed Tributary	Passive Sampler	3	4	4	4	4	4	4	4	4	4	4	X

Notes:

X – sample collected

1-3 – no sample collected due to:

1 – Ice

2 – August 2007 sample collected September 5, 2007

3 – Dry

4 – Passive sampler did not indicate precipitation event

Table TR RAI 2.9-43b-2: Proposed Operational Stream Sampling Locations

Site ID	Name	Sample Type	Location in NAD 27, South Dakota State Plane South (feet)	
			Northing	Easting
BVC11	Beaver Creek Downstream	Grab	433,638	1,022,546
BVC14	Beaver Creek Upstream	Grab	446,829	1,012,976
CHR01	Cheyenne River Upstream	Grab	423,009	1,016,699
CHR05	Cheyenne River Downstream	Grab	405,925	1,047,227
PSC11	Pass Creek Downstream	Passive sampler	431,452	1,028,064
PSC12	Pass Creek Upstream	Passive sampler	446,470	1,031,222
BEN01	Bennett Canyon	Passive sampler	416,196	1,047,473
UNT01	Unnamed Tributary	Passive sampler	422,482	1,039,166
UNT02	Unnamed Tributary	Passive sampler	424,478	1,035,236
UNT03	Unnamed Tributary	Passive sampler	425,438	1,029,910

TR RAI 5.7.8-19

NRC staff notes that the application does not provide a description of proposed surface water and water well sampling methods and parameters that will be measured and analytically analyzed in surface water samples and water well samples. Please provide this information. This information is necessary for staff to assess the manner in which the Dewey-Burdock project activities will be protective of human health and the environment.

TR RAI 5.7.8-19 Response

Following is a description of the sampling methods and parameters to be analyzed in the operational surface and groundwater monitoring program. This information will be incorporated into the revised TR. For a description of the proposed sample locations and sample frequency in the operational surface water monitoring program, refer to the responses to TR RAI 5.7.8-1, TR RAI 5.7.8-2 and TR RAI 2.9-43(b). Information on proposed sample locations and sample frequency for the operational groundwater monitoring program is found in the response to TR RAI 5.7.8-17. **Operational Surface Water Sampling Methods and Parameters** Impoundments will be sampled by collecting grab samples. Prior to sampling, the sampler will conduct a visual survey of the impoundment to identify an appropriate sample location. This will include an area free of ice or floating debris and with sufficient water depth to permit sample collection without disturbing sediments. If necessary, a clean, long-handled dip sampler will be used. Typically the sample location will be near the impoundment embankment where the water is deepest. Grab samples will be collected in clean sample containers provided by the contract laboratory. Water will be obtained by filling the containers from the top 10 cm (4 in) of the water column. Samples will be field-preserved where required. The sample containers will be kept cool (less than 4°C) until delivery to the contract laboratory. Streams will be sampled by grab sampling or with automatic samplers. Perennial stream sampling locations include those on Beaver Creek and the Cheyenne River. These will be sampled by collecting grab samples as described above. Passive samplers (single-stage samplers) will be installed at all other stream sampling sites from April through October. These will automatically collect samples when the flow rate in the channel reaches a field-adjustable minimum depth threshold. Following the runoff event the water will be manually transferred from the temporary sample container to clean sample bottles and submitted to the contract laboratory for analysis. Representative water of that collected in the grab samples will be analyzed in the field for pH, conductivity and temperature.

Impoundment and stream samples will be analyzed for the parameters presented in Table TR RAI 5.7.8-19-1.

Table TR RAI 5.7.8-19-1: Operational Surface Water Monitoring Parameter List and Analytical Methods

Parameter	Units	Analytical Method
Uranium, dissolved	mg/L	E200.8
Uranium, suspended	mg/L	E200.8
Ra-226, dissolved	pCi/L	E903.0
Ra-226, suspended	pCi/L	E903.0
Th-230, dissolved	pCi/L	E907.0
Th-230, suspended	pCi/L	E907.0
Pb-210, dissolved	pCi/L	E909.0M
Pb-210, suspended	pCi/L	E909.0M
Po-210, dissolved	pCi/L	RMO-3008
Po-210, suspended	pCi/L	RMO-3008